Claims

1. Value document (1) with at least one security element (6) which comprises in a marker region (4) a marker layer (8) applied to a carrier body (2) and comprising electroluminescent pigments (10), characterised in that the electroluminescent pigments (10) each comprise a pigment core (20) formed of an electroluminescent material which is surrounded by an optically active coating (24).

2. Value document (1) according to claim 1, in which the coating (26) has at least two layers (26, 28, 30) with a different refractive index.

3. Value document (1) according to claim 1 or 2 in which the pigments (10) have a mean pigment size of around 1 µm to 50 µm, preferably around 3 µm to 8 µm.

4. Value document (1) according to any of claims 1 to 3 in which the electroluminescent material forming the pigment core (20) concerned has a cubic crystal structure.

5. Value document (1) according to any of claims 1 to 4 in which the electroluminescent material forming the pigment core (20) concerned comprises a II-VI compound, preferably (co-)doped ZnS, ZnSe, SrS, CaS or CdS.

6. Value document (1) according to claim 5 in which the doping comprises as an activator Cu and/or Au and/or Mn and as co-activator halogenide ions or trivalent cations.

7. Value document (1) according to any of claims 1 to 6, in which one layer (26, 28, 30) of the coating (24) is formed of inorganic material, preferably oxides, nitrides, oxysulphides, sulphides of metals or semi-metals or those (co-)doped with metals or semi-metals.

8. Value document (1) according to claim 7 in which the inorganic material provided is SiO_2, SiO, TiO_2, NiO, Ni_2O_3, CoO, Co_2O_3, Y_2O_3 or ZrO_3.

9. Value document (1) according to claim 7 in which the inorganic material comprises a metal, preferably Fe and/or Co and/or Ni and/or Cr and/or Mo and/or W and/or V and/or Nb.

10. Value document (1) according to any of claims 1 to 9 in which the coating (24) only partly covers the surface of the pigment core (20) concerned.

11. Value document (1) according to any of claims 1 to 10 in which the coating (24) is selected in respect to refractive indices of individual layers (26, 28; 30) and/or the coating thickness is dimensioned such that the spectral transmission of the coating (24) has a maximum at a pre-specified wavelength.

12. Electroluminescent pigment (10), in particular for use in the value document (1) according to any of claims 1 to 11, with a pigment core (20) formed of electroluminescent material which is surrounded by a coating (24) with non-linear transmission and/or absorption behaviour.

13. Method for production of a value document (1) according to any of claims 1 to 11 in which to produce the marker layer (8) a resin (32) is applied to the carrier body (2) and softened, where in the softened state of the resin (32) pigment cores (20) are applied such that the pigment cores (20) sink at least partly into the resin (32) so that only part of the surface of the pigment cores (20) protrudes from the resin (32), and where the coating (24) is then applied by means of physical vapour deposition (PVD) and/or chemical vapour deposition (CVD).

14. Method according to claim 13 in which an acrylate-based resin (32) is used.

15. Method according to claim 13 or 14 in which the pigment cores (20) are scattered on the resin (32) via a sieve.

16. Method for production of a value document (1) according to any of claims 1 to 11, in which the marker layer (8) is applied to the carrier body (2) by means of a printing process, preferably by means of screen printing, rotogravure, offset printing, letterset printing or a transfer process.

17. Method according to claim 16 in which on application of the marker layer (8) a printing ink is used which also contains, in addition to the electroluminescent pigments (10), a solvent and/or binding agent.

18. Method according to claim 16 or 17 in which the printing ink contains a total pigment proportion of less than 30%, preferably less than 25%.

19. Method for production of electroluminescent pigments (10) according to claim 12 in which the pigment cores (20) are equipped with the coating (24) by means of physical vapour deposition (PVD) and/or chemical vapour deposition (CVD) and/or plasma process and/or a sol-gel process and/or polymerisation and/or electrochemical/galvanic coating and/or eddy coating process and/or by means of self-assembling and/or hybridisation.

20. Method according to claim 19 in which the pigment cores after coating (24) are subjected to a grinding process such that part of the coating (24) is broken away so subsequently maximum one part of the surface of the respective pigment core (20) is covered with the coating (24).

21. Method according to claim 20 in which the grinding process is performed in a ball mill, where before the start of or during grinding, a grinding aid is added.

22. Method according to claim 21 in which the grinding aid is acetylcholine and/or oil and/or a watery suspension.

23. Method according to claim 20 in which the grinding process is performed on ink production in a three roller ink machine, where the coated pigments (10) are part of the ink.

24. Method according to claim 23 in which ink binders and ink pigments are provided as further constituents of the ink.

25. Method according to claim 23 or 24 in which the spacing of the surfaces of the rollers of the three roller ink machine is set to a value of maximum the mean diameter of the pigments (10).

26. Method according to any of claims 20 to 25 in which the grinding process is performed for a maximum of 2 hours.